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1ER16CV051

7th Sem 'B'

Municipal and Industrial waste water Engineering.

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1) Explain the factors affecting quantity of dry weather flow.

Day Weather flow :- Domestic Sewage and Industrial Sewage Collectively called as DWF. It does not contain storm water.

Factors Affecting DWF

- 1) Rate of water supply
- 2) Population growth
- 3) Type of area served
- 4) Infiltration of ground water.

Rate of water supply :- The rate of water supply to a city or town is expressed as many l/capita/day. The quantity of waste water entering the sewers would be less than the total quantity of water supplied. This is because of the fact that water is lost as domestic consumption, evaporation, lawn sprinkling, fire fighting, industrial consumption.

Population Growth: The quality of sanitary sewage directly depends on the population. As the population increases the quality of sanitary sewage also increases. The quality of water supply is equal to the rate of supply multiplied by population.

Types of Area Served The quality of sanitary sewage also depends on the types of area to be served whether it is residential, industrial or commercial.

Infiltration of Ground water: Ground water or sub-soil water may infiltrate into the sewers through the leaky joints. Ex-filtration in the sewer process indicates the flow of waste water from the sewer into the ground.

2) Explain the test to be conducted for the sewers before putting them under service?

It is necessary to test the sewer after its laying for water tightness before backfilling of the excavated earth.

Smoke tests This test is performed for soil pipes, vent pipes, laid above ground. The test is conducted under a pressure of 2.5m of water and maintained for 15 min after all stop used.

Water test: This test is performed for underground sewer pipe before backfilling is done the test should be carried out by suitable plugging the lower end of the drain and filling the system with water.

Test for Straightness & Obstruction

For this test, a mirror is placed in front of one end of sewer and the image of the section is observed. If the sewer line is straight, the image should be circular.

③ What are sewer appertences? List them and explain Catch basin and man hole with neat sketch.

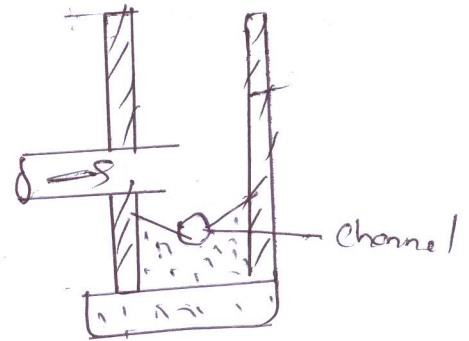
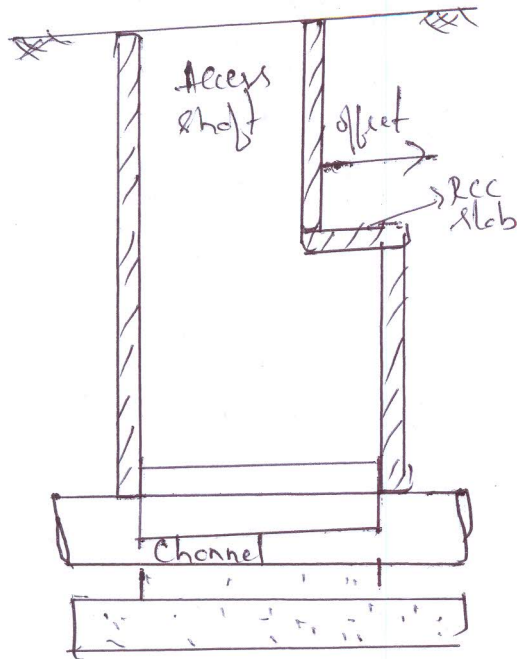
→ Sewage flowing in the sewer line contains a large number of impurities in the form of silt, fat, oil, logs etc. Under normal flow they are not likely to settle and choke the sewer, but during small flows self-cleansing velocity.

- 1) Manhole
- 2) Inlets
- 3) Catch basins
- 4) Regulators
- 5) Lamp holes
- 6) Grease and oil traps.

Manholes

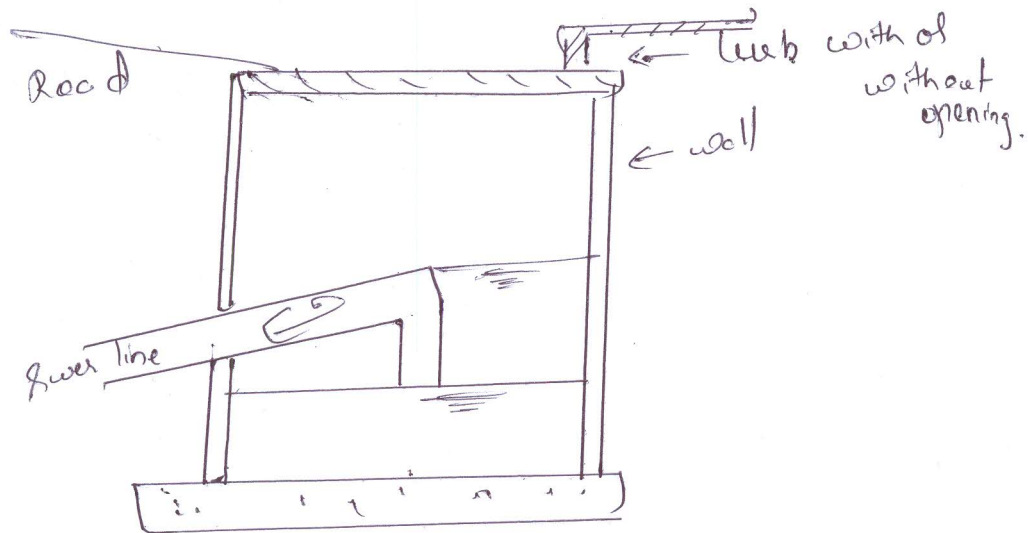
Shallow Manhole : are the one which are about 0.75 to 0.9m in depth. they are constructed at the start branch.

Deep Manhole are those which are deeper than 1.5m. the size of such a manhole is larger at the bottom which is reduced at the top to reduce the size of manhole lower.



Catch Basin

Catch basins are the structure of pucca chambers and a short lower. They are meant for the retention of suspended grit, sludge and other heavy debris and floating rubbish from rain water which otherwise might have entered and cause choking problem.



- 4) Explain the term i) Self-Cleaning & non-Swallowing Velocity
 ii) Time of Concentration.

The time taken for the maximum runoff rate of develop unknown as the time of Concentration, and is equal to the time required for a drop of water to run from the farthest point of the watershed.

$$t_c = t_e + t_f$$

t_c = time of Concentration

t_e = time of entry to the inlet

t_f = time of flow in the sewer

- 5) Explain self Purification of streams:

When wastewater is discharged into the rivers of streams, the BOD of river increases initially and DO level starts falling.

As river water travels further BOD gradually reduces and DO increases and reach its restoration level.

Thus river gets purified on its own.

This phenomena is known as self Purification of stream.

- 6) The rate of water supply to a town covering an area of 100 hectares having a population 5000 is 15 lpd/cap, 80% of which flow out of wastewater. The peak flow of wastewater may be taken 2.5 times the average flow.

% of total	Name of surface	Run-off Co-efficient
45	Hard pavement	0.8
20	unpaved	0.4
20	Grass & lawn	0.25
15	wooden area	0.15

Design the sewer section to develop a maximum velocity of 2.5 m/s when it runs half full at peak combined flow.

Soln:

$$= \frac{50000 \times 150 \times 0.8 \times 2.5}{24 \times 60 \times 60}$$

$$= \underline{\underline{193.611}}$$

By the table

45	0.8	= 0.8625
20	0.4	0.5
20	0.25	0.8
15	0.15	1
<hr/>		<hr/>
100		2.8625

$$= \frac{2.8625}{1} = \underline{\underline{2.8625}}$$

$$Q = AV$$

$$Q = N_4 \times d^2 \times V$$

$$173.6117 = N_4 \times d^2 \times 2.5$$

$$d = \frac{9.402}{2} = 3.5$$

$$KD = 27d$$

$$= 1$$

$$2D = d$$

$$D = \frac{9.4}{2}$$

$$D = \frac{3.8}{2}$$